PATENT ABSTRACTS OF JAPAN

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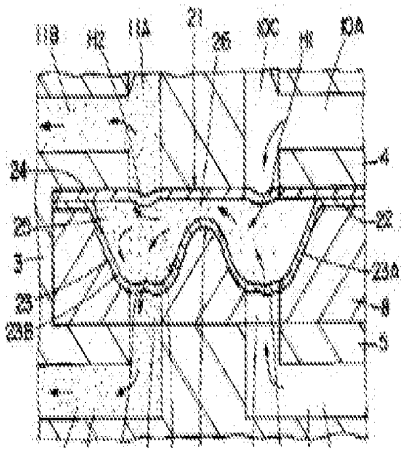
(54) BLISTER PACK

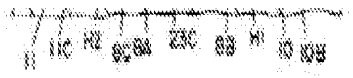
(57)Abstract:

PROBLEM TO BE SOLVED: To enhance the efficiency of administration by causing medical powders contained in a medical powder storage part to be diffused according to the characteristic of the powders.

SOLUTION: The medical powder storage part 25 of a blister pack 21 is provided with a constricted passage 26 located between an inflow hole H1 and an outflow hole H2 and comprising the constricted section 23C of a swollen part 23. Thus, the flow rate of an air stream flowing from the inflow hole H1 to the outflow hole H2 can be increased by the constricted passage 26, and the air stream that matches the characteristic of the chemical powders can be formed by regulating the area of the constricted passage 26. Thus, by means of the air stream matching the medical powders, the medical powders in the medical powder storage part 25 can be diffused and efficiently mixed into the air stream, so that a specified quantity of medical powders stored in the medical powder storage part 25



can be administered to a patient.



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I, Satoru Kakeno, residing at 1-2, Saiwai 2-chome, Ichikawa-shi, Chiba 272-0123, Japan, and working for ISP Corporation of 1-29, Akashi-cho, Chuo-ku, Tokyo 104-0044, Japan, fully conversant with the English and Japanese languages, do hereby certify that to the best of my knowledge and belief the following is a true translation of Japanese Patent Application No. 11-352280 filed in the Japanese Patent Office on the 10th day of December, 1999 in respect of an application for Letters Patent.

Signed, this 2nd day of June, 2006

S. Kakeno

Satoru Kakeno

(2)

[DOCUMENT NAME] SPECIFICATION

[Title of the Invention] BLISTER PACK

[Scope of Claim for Patent]

[Claim 1] A blister pack comprising:

a base panel having a blistered portion; and

a lid panel affixed onto an obverse of the base panel to define a medical powder storage chamber by hermetically covering the blistered portion;

wherein a flow-constriction orifice passage is provided between inflow and outflow holes pricked by piercing in the blistered portion.

[Claim 2] The blister pack as claimed in claim 1, which further comprises a flap valve disposed in the flow-constriction orifice passage and opens during inhaling operation.

[Claim 3] A blister pack comprising:

a base panel having a blistered portion; and

a lid panel affixed onto an obverse of the base panel to define a medical powder storage chamber by hermetically covering the blistered portion;

wherein a medical powder collecting portion is recessed between inflow and outflow holes pricked by piercing in the blistered portion to pre-store medical powder therein.

[Claim 4] A blister pack comprising:

a base panel having a blistered portion; and

a lid panel affixed onto an obverse of the base panel to define a medical powder storage chamber by hermetically covering the blistered portion;

wherein the blistered portion comprises:

a sloped surface which defines a shallow portion at a side of an inflow hole pricked by piercing in the blistered portion and defines a deep portion at a side of an outflow hole pricked by piercing in the blistered portion.

[Claim 5] A blister pack comprising:

a base panel having a blistered portion; and

a lid panel affixed onto an obverse of the base panel to define a medical powder storage chamber by hermetically covering the blistered portion;

wherein the blistered portion comprises:

a sloped surface which defines a deep portion at a side of an inflow hole pricked by piercing in the blistered portion and defines a shallow portion at a side of an outflow hole pricked by piercing in the blistered portion.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a blister pack suitable to an inhalant medicator used to prescribe granular or powdered medicines toward within lungs of a patient by way of breathing action of the patient.

[0002]

[Prior Art]

Of these medications for an asthmatic patient, an inhalant medicator used for an inhalation treatment where a dose of medical powder encapsulated in a capsule is inhaled, is generally constructed by a medicator body including a capsule housing chamber at one axial end and equipped at the other axial end with an inhalant port

through which the medical powder is inhaled, an air passageway communicating the inhalant port with the atmosphere via the capsule housing chamber, and a pricking tool provided for pricking holes in the capsule accommodated in the capsule housing chamber.

[0003]

There have been proposed and developed various inhalant medicators utilizing a blister pack having a set of blisters or a plurality of blistered medical powder storage chambers spaced apart from each other in the circumferential direction, for inhalant medication. Such inhalant medicators have been disclosed in Japanese Patent Provisional Publication Nos. 59-88158 and 62-41668.

[0004]

The prior art blister pack used for the inhalant medicator is mainly comprised of a base panel formed with a plurality of blistered portions and a lid panel affixed onto an obverse of the base panel to define a medical powder storage chamber by hermetically covering the blistered portions. Granular or powdered medicines are stored in the medical powder storage chamber.

[0005]

In order to prescribe the medical powder toward within lungs of the patient, holes are pricked in the blister pack by means of a single plunger having a needle-shaped pricking tip, in such a manner as to communicate the medical powder storage chamber with the inhalant port. Under these conditions, when the patient draws his or her breath while taking the inhalant port

in his or her mouth, air flow directed from the pricked holes through the medical powder storage chamber into the inhalant port enables medical powder stored in the medical powder storage chamber to be carried via the inhalant port into lungs of the patient.

[0006]

In order to continuously perform inhalant medication, the blister pack is rotated to intercommunicate another medical powder storage chamber and the inhalant port. Thus, it is possible to consecutively dose a patient with a specified amount of medical powder without exchanging a capsule.

[0007]

[Task solved by the Invention]

However, in the previously described prior art blister packs, in order to prick holes in the blister pack, a single plunger is used as the pricking tool. Thus, two holes, straightly penetrating the blister pack, are pricked or pierced in the blister pack. Air introduced into the medical powder storage chamber flows straight through the medical powder storage chamber from one of the two pricked holes to the other.

[0008]

Therefore, in spite of various sorts of medical powder having different characteristics or properties, such as a particle size (fine powder, granule, or the like), a condensation property, and an amount of medical powder for one inhaling operation, the flow velocity and flow direction of airflow becomes substantially constant. Thus, it is impossible to adequately diffuse medical

powder in the medical powder storage chamber and thus some medical powder may be undesirably left in the medical powder storage chamber. As a result of this, the patient cannot inhale a specified amount of medical powder into the lungs, thus lowering medical benefits of powdered or granular medicines.

[0009]

The present invention has been made to solve the aforementioned disadvantages of the prior art, and accordingly an object thereof is to provide a blister pack, which is capable of enhancing the medication efficiency by diffusing medical powder stored in a medical powder storage chamber depending on the property of the medical powder.

[0010]

[Means to solve the Task]

In order to accomplish the aforementioned objects of the present invention, a blister pack of the present invention comprises a base panel having a blistered portion, and a lid panel affixed onto an obverse of the base panel to define a medical powder storage chamber by hermetically covering the blistered portion.

[0011]

In order to solve the previously-noted task, the invention recited in claim 1, is characterized in that a flow-constriction orifice passage is provided between inflow and outflow holes pricked by piercing in the blistered portion.

[0012]

With the previously noted arrangement, when airflow flowing from the inflow hole into the medical powder storage chamber is further directed to the outflow hole, the airflow passes through the flow-constriction orifice passage, and whereby the flow velocity becomes fast. By properly adjusting the passage area of the flow-constriction orifice passage depending on the property of medical powder, it is possible to create and realize the optimal airflow suitable for the medical-powder property.

[0013]

According to the invention as recited in claim 2, a flap valve is further disposed in the flow-constriction orifice passage and opens during inhaling operation.

[0014]

With the previously-noted arrangement, in the case of a poor inhalation force during inhaling operation, the flap valve closes the flow-constriction orifice passage. When the inhalation force has been increased up to a level enough to diffuse medical powder, the flap valve opens the flow-constriction orifice passage to permit airflow through the opened valve. Thus, it is possible to restrict or limit inhaling operation in a state where the inhalation force is weak, and to permit inhaling operation only in a state where the inhalation force is strong enough to adequately diffuse medical powder by airflow.

[0015]

According to the invention as recited in claim 3, a medical powder collecting portion is recessed between

inflow and outflow holes pricked by piercing in the blistered portion to pre-store medical powder therein.

[0016]

With the previously-noted arrangement, when airflow flowing from the inflow hole into the medical powder storage chamber is further directed to the outflow hole, the airflow acts to gradually fling up and diffuse medical powder located in the medical powder collecting portion. Thus, it is possible to uniformly diffuse a small amount of medical powder in air.

[0017]

On the other hand, according to the invention as recited in claim 4, in the blistered portion, a sloped surface is formed to define a shallow portion at a side of an inflow hole pricked by piercing in the blistered portion and to define a deep portion at a side of an outflow hole pricked by piercing in the blistered portion.

[0018]

With the previously-noted arrangement, the medical powder, stored in the medical powder storage chamber, is accumulated around the outflow hole by way of the sloped surface. Thus, airflow flowing from the inflow hole toward the outflow hole forcibly pushes out the medical powder accumulated around the outflow hole, and as a result it is possible to flow the medical powder stored in the storage chamber out of the outflow hole at a breath.

[0019]

According to the invention as recited in claim 5, in the blistered portion, a sloped surface is formed to define a deep portion at a side of an inflow hole pricked

by piercing in the blistered portion and to define a shallow portion at a side of an outflow hole pricked by piercing in the blistered portion.

[0020]

With the previously-noted arrangement, the medical powder, stored in the medical powder storage chamber, is accumulated around the outflow hole by way of the sloped surface. Thus, airflow flowing out of the inflow hole collides directly with the medical powder, and thus it is possible to adequately diffuse the medical powder, thereby ensuring uniform dispersion of medical powder in air.

[0021]

[Description of the Preferred Embodiments]

Hereinafter described in detail with reference to the drawings is the blister pack of the embodiment of the invention, which is used for an inhalant medicator.

[0022]

Figs. 1 to 12 show the first embodiment of the present invention. First, hereunder explained in reference to Figs. 1 to 7 is the construction of the inhalant medicator, which is suitable to the blister pack of the embodiment.

[0023]

Reference sign 1 denotes an inhalant medicator assembly. The inhalant medicator assembly 1 is mainly constructed by a medicator body 2 (described later) and an inhalant port 7 (described later).

[0024]

Reference sign 2 denotes the medicator body of the inhalant medicator assembly 1. As shown in Figs. 3 and

4, the medicator body 2 is constructed by integrally connecting upper and lower medicator-body portions 4 and 5. The medicator body 2 is comprised of a substantially cylindrical joining portion 3 into which an inhalant port 7 is installed, a substantially semi-circular upper medicator-body portion 4 extending axially from the joining portion 3, a substantially semi-circular lower medicator-body portion 5 spaced apart from the underside of the upper medicator-body portion 4 by a clearance space and extending axially from the joining portion 3, a holder mounting groove 6 defined between the upper and lower medicator-body portions 4 and 5. As a whole, the medicator body is substantially cylindrical in shape. Also, the joining portion 3 is formed on its inner periphery with an internal thread portion 3A into which the inhalant port 7 is screwed. On the other hand, the upper medicator-body portion 4 is formed on the outer periphery with a pricking tool guide 4A capable of slidably supporting a support portion 13 of a pricking tool 12 (described later).

[0025]

Reference sign 6 denotes a holder mounting groove formed in medicator body 2. The holder mounting groove 6 is defined in the medicator body by three surfaces, namely a groove innermost end surface 6A forming part of the joining portion 3, the ceiling wall surface 6B corresponding to the underside of upper medicator-body portion 4, and the bottom surface 6C corresponding to the upside of lower medicator-body portion 5. And thus, the holder mounting groove 6 is formed to open to three

directions, that is, leftwards and rightwards, and in one axial direction of the medicator body. The innermost end surface 6A of the groove is formed into a concave circular-arc shape that fits the contour of the outer periphery of a blister pack holder 8.

[0026]

The medicator body is formed with a protruded portion 6D extending upwards from a substantially central portion of the bottom surface 6C of holder mounting groove 6. The central protruded portion 6D functions as a center of rotation of the blister pack holder 8. The protruded portion 6D is engaged with a guide groove 8E (described later).

[0027]

Reference sign 7 denotes an inhalant port that is installed on the joining portion 3 of medicator body 2. The inhalant port 7 is formed on its outer periphery with an external screw portion 7A. The top end of inhalant port 7 is configured in a manner so as to gradually diametrically small-sized. The root portion of inhalant port 7 is formed with a plurality of radially-extending auxiliary air passageways 7B,.7B, ... (only two auxiliary air passageways are shown in the drawing for the purpose of illustrative simplicity). Each of the auxiliary air passageways 7B serves to avoid the difficulty in breathing action by increasing a quantity of air flowing into inhalant port 7 of the inhalant medicator during the breathing action through inhalant port 7. Inhalant port 7 is installed on the medicator body by screwing the

external thread portion 7A into the internal thread portion 3A of joining portion 3.

[0028]

Reference sign 8 denotes the holder 8 that is detachably rotatably mounted into the holder mounting groove 6 of medicator body 2. As clearly shown in Figs. 6 and 7, the holder 8 has a substantially disc shape. The holder 8 is formed on its upside with eight recessed fit portions 8A, 8A, ..., 8A circumferentially spaced apart from each other by 45 degrees and located near its circumference. In the shown embodiment, eight recessed fit portions 8A are configured or formed as eight radially-elongated, substantially semi-cylindrical cavities. Eight blistered portions 23 of blister pack 21 (described later) are integrally fitted into the respective eight recessed fit portions of the holder. The holder is formed in each of recessed fit portions 8A with an inflow pin insertion hole or a radially inward pin insertion hole 8B and an outflow pin insertion hole or a radially-outward pin insertion hole 8C spaced apart from each other in the radial direction of the holder 8.

[0029]

The holder 8 is also formed on its underside with eight recessed fit portions 8D, 8D, ..., 8D located inside of inflow pin insertion holes 8B and circumferentially spaced apart from each other by 45 degrees, taking into account the installation positions of pin insertion holes 8B and 8C. In the shown embodiment, spherical ball portions 9B included in a positioning mechanism 9

(described later) are fitted to one diametrically-opposed pair 8D of the eight recessed fit portions. Furthermore, the holder 8 is also formed on the underside with the guide groove 8E radially extending from the center of rotation of the holder 8. The guide groove 8E is formed to guide the protruded portion 6D of the holder mounting groove 6 toward the center of rotation of the holder 8.

[0030]

The holder 8 is rotatably mounted into the holder mounting groove 6 in accordance with the following procedures. First, the guide groove 8E is engaged with the central protruded portion 6D under a condition where the blister pack 21 is installed on and fitted to the upside of the holder. Thereafter, the holder installing thereon the blister pack, is inserted into the holder mounting groove, until the innermost end of the guide groove reaches the protruded portion.

[0031]

Reference signs 9, 9 denote positioning mechanisms (see Fig. 5) provided in the medicator body 2. As shown in Figs. 4 and 5, the positioning mechanism 9 includes spring-loaded ball housing bores 9A each closed at one end, point-symmetrical with respect to the protruded portion 6D in such a manner as to sandwich therebetween the central protruded portion, and formed in the bottom surface 6C (lower medicator-body portion 5) of holder mounting groove 6. The positioning mechanism 9 also includes spring-loaded spherical balls 9B housed in the respective ball housing bores 9A in an unremovable fashion so that the inside diameter of the opening end of each

spring-loaded ball housing bore is slightly less than the inside diameter of the other portion of the bore, and coil springs 9C operably disposed in the respective ball housing bores 9A in a manner so as to permanently bias the balls 9B in their protrusion directions.

[0032]

With the previously-noted arrangement of the positioning mechanism 9, when the holder 8 is rotated under a condition where the holder 8 has been mounted into the holder mounting groove 6, the spring-loaded balls 9B can be brought into engagement with the respective recessed fit portions 8D of the holder 8. By way of the engagement between the spring-loaded balls and the recessed fit portions with the rotary motion of the holder, one of radially-elongated recessed fit portions 8A (that is, one of medical powder storage chambers 25 of blister pack 21) is efficiently positioned in a predetermined pricking position of the pricking tool 12, that is, in a set inhalation position for inhalant medication.

[0033]

Reference sign 10 denotes an inflow air passageway formed in the medicator body 2. The inflow air passageway 10 is provided to permit the atmosphere outside air to be introduced or directed toward within the recessed fit portion 8A of the holder 8. Also, the inflow air passageway 10 includes an upper axially-extending air passage 10A which is bored or formed in the upper medicator-body portion 4, and whose one axial end opens at one axial end of the upper medicator-body portion 4 to the atmosphere. In a similar manner, the inflow air passageway also

includes a lower axially-extending air passage 10B which is bored or formed in the lower medicator-body portion 5, and whose one axial end opens at one axial end of the lower medicator-body portion 5 to the atmosphere. The inflow air passageway also includes a radially-extending pin insertion hole 10C formed in the medicator body so that the pin insertion hole radially extends from the pricking tool guide 4A via the upper medicator-body portion 4 toward the lower medicator-body portion 5. The radially-extending pin insertion hole is fluidly communicated with the other axial end of each of the upper and lower axially-extending air passages 10A and 10B. The pin insertion hole 10C is configured to be able to communicate with the inflow pin insertion hole 8B of the holder 8, when one of the recessed fit portions of the holder is positioned in the pricking position.

[0034]

Reference sign 11 denotes an outflow air passageway formed in the medicator body 2. The outflow air passageway 11 is provided to permit medical powder stored in the medical powder storage chamber 16D of the blister pack 16 to flow into the inhalant port 7. The outflow air passageway 11 includes a pin insertion hole 11A radially extending in parallel with the pin insertion hole 10C of the inflow air passageway 10, an upper outflow air passage 11B, and a lower outflow air passage 11C. The upper outflow air passage axially extends from the upper medicator-body portion 4 via the joining portion 3 toward the inhalant port. One axial end of the upper outflow air passage is fluidly communicated with the pin insertion

hole 11A, whereas the other axial end opens to the interior space of the inhalant port 7. In a similar manner, one axial end of the lower outflow air passage is fluidly communicated with the pin insertion hole 11A, whereas the other axial end opens to the interior space of the inhalant port 7.

[0035]

Reference sign 12 denotes the pricking tool used to prick holes in the blister pack 21. As shown in Fig. 1, the pricking tool 12 includes the support portion 13 whose outer periphery is slidably supported or guided by a cylindrical inner peripheral wall of the pricking tool guide 4A, and a pair of parallel pins 14, 14 whose root portions are fixedly connected to the support portion 13, and whose tips are inserted into the respective pin insertion holes 10C and 11A. The pricking tool also includes a return spring 15 disposed between the support portion 13 and the upper medicator-body portion 4 for permanently biasing the support portion and the pins toward their initial positions.

[0036]

When pushing the support portion 13 of pricking tool 12 into the pricking tool guide 4A against the bias of the spring 15, and thus the pins 14, 14 are inserted into the respective pin insertion holes 10C and 11A. Thus, the tips of pins 14, 14 penetrate the blister pack 21. As a result of this, inflow holes or inflow ports H1 and outflow holes or outflow ports H2 are pricked respectively in the blistered portion 23 of a base panel 22 and a lid panel 24 of blister pack 21 (see Figs. 11 and 12). As

detailed hereunder, eight blistered portions of the base panel define eight medical powder storage chambers 25 in conjunction with the lid panel. After pricking, as soon as the pushing force applied to the support portion 13 is removed, the support portion 13 and the pins 14, 14 are returned back to their initial positions by way of the spring bias.

[0037]

Hereinafter described in detail in reference to Figs. 8 to 10 is the blister pack of the embodiment which is used for the previously-discussed inhalant medicator.

[0038]

Reference sign 21 denotes a blister pack of the first embodiment, which is detachably attached to the inhalant medicator. Blister pack 21 is comprised of a base panel 22, a lid panel 24, and a medical powder storage chamber 25, and a flow-constriction orifice passage 26.

[0039]

Reference sign 22 denotes a base panel, which is a base portion of the blister pack 21. Base panel 22 has a thin-walled disc shape and made of aluminum material, synthetic resin or the like. Additionally, base panel 22 has a plurality of blistered portions 23, 23, ... formed around its entire circumference. The blistered portions 23 are located near the circumference of the base panel 22, and formed as eight convex portions spaced apart from each other in the circumferential direction.

[0040]

As shown in Figs. 9 and 10, the blistered portion 23 is formed as the radially-elongated convex portions

each extending in the radial direction of base panel 22. Each of the blistered portions includes a radially-inward, substantially hemispherical convex portion 23A and a radially-outward, substantially hemispherical convex portion 23B. A flow-constriction portion 23C is formed between the radially-inward and radially-outward hemispherical convex portions 23A and 23B. The flow-constriction portion is configured to provide a flow-constriction orifice passage 26 between the base panel and the lid panel 24 at a connecting point between the radially-inward and radially-outward hemispherical convex portions 23A and 23B in close proximity to the inner wall of lid panel 24.

[0041]

Reference sign 24 denotes the lid panel affixed onto the principal surface or the obverse of base panel 22. Lid panel 24 has a thin-walled disc shape and made of aluminum material, synthetic resin, or the like. By hermetically covering the blistered portions 23 formed in base panel 22 by the lid panel 24, medical powder storage chambers 25 are defined between the blistered portions 23 and the lid panel.

[0042]

Reference sign 25 denotes the medical powder storage chamber defined between each of the blistered portions 23 and the lid panel 24. Medical powder is pre-stored in each of medical powder storage chambers 25. The flow-constriction orifice passage 26 is formed in the medical powder storage chamber 25 and arranged between

the previously-described inflow holes H1 and outflow holes H2.

[0043]

Reference sign 26 denotes the flow-constriction orifice passage arranged between inflow holes H1 and outflow holes H2 and defined between the flow-constriction portion 23C of the blistered portion 23 and the lid panel 24. The flow-constriction orifice passage 26 functions to increase the flow velocity of air flowing from the inflow holes H1 via the interior of the medical powder storage chamber 25 to the outflow holes H2. Additionally, the flow-constriction orifice passage functions to cause proper turbulent flow within the medical powder storage chamber 25, and whereby airflow can be created depending on the property of medical powder and good medical powder mixing action and diffusion can be ensured.

[0044]

The inhalant medicator and blister pack 21 of the present embodiment is constructed as previously discussed. Hereinbelow described in detail in reference to Figs. 11 and 12 are the preliminary operation of inhalant medication through which a patient inhales medical powder, and the flow of air and the flow of medical powder during inhalation.

[0045]

First, the holder is removed from the holder mounting groove 6 of medicator body 2. During removal of the holder, the guide groove 8E, formed in the underside of the holder 8, must be aligned with respect to the axis of the medicator body under a condition in which the outermost end of guide

groove faces the inhalant port 7. Then, the holder 8 can be removed from the medicator body by pulling the holder against the bias produced by the positioning mechanism 9.

[0046]

Then, blister pack 21 is fitted to and installed on the upside of holder 8. At this time, by fitting the blistered portions 23 (the medical powder storage chambers 25) of the blister pack 21 to the respective recessed fit portions 8A of the holder 8, the blister pack 21 can be integrally connected to and positioned with respect to the holder 8, and thus the blister pack and the holder are rotatable together with each other.

[0047]

After the blister pack 21 has been installed on the holder 8, the holder 8 is mounted into the holder mounting groove 6. In this case, the guide groove 8E must be aligned with the axis of the medicator body so that the outermost end of the guide groove is directed toward the inhalant port 7, and also the protruded portion 6D must be engaged with the guide groove 8E so as to push the holder 8 into holder guide groove 6. In this manner, after the holder 8 has been completely pushed into the holder mounting groove until the innermost end of the guide groove engages with the protruded portion, balls 9B, 9B of the positioning mechanism 9 are engaged with the recessed fit portions 8D of the holder 8 by rotating the holder 8 in an arbitrary direction. By way of a series of preliminary setting operations as discussed above, as shown in Fig. 9, it is possible to accurately position one of the medical

powder storage chambers 25 of blister pack 21 at the predetermined pricking position (the set inhalation position of medical powder).

[0048]

Hereunder described in detail is the actual operation of inhalant medication made by virtue of breathing action of a patient. First, in order to prick holes in the blister pack 21 held at the predetermined pricking position, the support portion 13 of pricking tool 12 is pushed or depressed. As shown in Figs. 11 and 12, two opposed inflow holes H1 communicating inflow air passageway 10 are pricked in the blistered portion 23 and in the lid panel 24 by means of one of the two pins 14 inserted into the pin insertion hole, and at the same time two opposed outflow holes H2 communicating outflow air passageway 11 are pricked in the blistered portion 23 and in the lid panel 24 by means of the other pin 14 inserted into the pin insertion hole. As a result, the medical powder storage chamber 25 of blister pack 21 is communicated through the inflow holes H1 with the inflow air passageway 10, and also communicated through the outflow holes H2 with the outflow air passageway 11.

[0049]

Under these conditions, when the patient draws his or her breath while taking the inhalant port 7 in his or her mouth, air passes through the inflow air passageway 10 via the two inflow holes H1 and then flows into the medical powder storage chamber 25. At this time, the air flow directed via the inflow holes H1 toward the outflow holes H2 passes through the flow-constriction orifice

passage 26. Thus, the flow-constriction orifice passage 26 increases the flow velocity of the airflow and also creates proper turbulent flow. As a result of this, it is possible to adequately diffuse and micronize the medical powder. As a consequence, it is possible to effectively flow out almost all of the medical powder pre-stored in the storage chamber 25 through the outflow holes H2 and the outflow air passageway 11 into the inhalant port 7 by virtue of the turbulent flow. As discussed above, during breathing action, the patient can inhale a specified amount of medical powder via his or her oral cavity and trachea into lungs with the aid of the turbulent flow.

[0050]

In this manner, the first inhalant medication can be completed. Subsequently to the above, when the second inhalant medication is needed, the holder 8 is first rotated from the current angular position by 45 degrees. The adjacent, next diametrically-opposed recessed fit portions 8D of holder are thus engaged with the balls 9B of the positioning mechanism 9. After this, through the previously-noted pricking operation and inhaling operation, it is possible to continuously inhale medical powder. In this manner, eight inhalant medications in total can be continuously made. Thereafter, the holder 8 is removed from the medicator body, and then the old blister pack 21 is replaced with a new blister pack for the next inhalation medication.

[0051]

As set forth above, according to the blister pack of the embodiment, the flow-constriction orifice passage 26 is provided in the medical powder storage chamber 25 of the blister pack 21 and arranged between the inflow holes H1 and outflow holes H2, and defined by the flow-constriction portion 23C of the blistered portion 23. By means of the flow-constriction orifice passage 26, the airflow flowing through the interior space of the medical powder storage chamber 25 can be adjusted depending on the property of medical powder. As a result of this, it is possible to form the controlled airflow (turbulent flow) suited for the property of medical powder by adjusting the flow passage area depending on the property of the administrated medical powder, such as a particle size (fine powder, granule, or the like), a condensation property, and an amount of medical powder for one inhaling operation. Thus, it is possible to efficiently reliably prescribe a specified amount of medical powder pre-stored in medical powder storage chamber 25 into lungs of a patient by way of breathing action. This enhances medical benefits of the medical powder, thereby enhancing the reliability of the inhalant medicator.

[0052]

Additionally, the blister pack 21 itself, in which medical powder is stored, has the flow-constriction orifice passage 26. Thus, it is possible to form a suitable flow-constriction orifice passage 26 depending on various sorts of medical powder, thereby more greatly enhancing the medication efficiency.

[0053]

Next, Figs. 13 through 16 show the blister pack of the second embodiment. As detailed hereunder, the blister pack of the second embodiment is characterized by a deeply-recessed medical powder collecting portion formed between the inflow holes and outflow holes pricked by piercing in he blistered portion. In explaining the second embodiment, for the purpose of simplification of the disclosure, the same reference signs used to designate elements in the first embodiment will be applied to the corresponding elements used in the second embodiment, while detailed description of the same reference signs will be omitted.

[0054]

Reference sign 31 denotes a blister pack of the second embodiment used instead of the blister pack 21 of the first embodiment. Blister pack 31 is comprised of a base panel 32, a medical powder collecting portion 34, a lid panel 35, and a medical powder storage chamber 36.

[0055]

Reference sign 32 denotes the base panel of blister pack 31 of the second embodiment. In the same manner as the base panel 22 of the blister pack of the first embodiment, base panel 32 has a thin-walled disc shape and made of aluminum material, synthetic resin or the like. Additionally, base panel 32 has a plurality of blistered portions 33, 33, ... formed around its entire circumference. The base panel 32 of the second embodiment is different from the base panel 22 of the first embodiment, in that the shape of each blistered portion 33 differs from that

of each blistered portion 23 of the blister pack of the first embodiment.

[0056]

As best seen in Fig. 14, each of the blistered portions 33 is formed as a substantially elliptical convex portion. Each of the blistered portions 33 includes a radially-inward, shallow pricked portion 33A in which the previously-noted inflow hole H1 is pricked, and a radially-outward, shallow pricked portion 33B in which the previously-noted outflow hole H2 is pricked. The medical powder collecting portion 34 is deeply formed or recessed in the blistered portion 33 midway between the radially-inward, shallow pricked portion 33A and the radially-outward, shallow pricked portion 33B.

[0057]

Reference sign 34 denotes the medical powder collecting portion formed in the blistered portion 33 and serves as an air-flow regulation means. The medical powder collecting portion 34 is formed as a deeply-recessed medical powder collecting portion and arranged between the radially-inward, shallow pricked portion 33A in which inflow hole H1 is pricked, and the radially-outward, shallow pricked portion 33B in which outflow hole H2 is pricked. Medical powder is collected in the medical powder collecting portion.

[0058]

On the other hand, reference sign 35 denotes the lid panel affixed onto the obverse of base panel 32. In the same manner as the previously-described lid panel 24 of the first embodiment the lid panel 35 has a thin-walled

disc shape and made of aluminum material, synthetic resin, or the like.

[0059]

On the other hand, reference sign 36 denotes the medical powder storage chamber defined between the blistered portion 33 and the lid panel 35. Medical powder is stored in the medical powder storage chamber 36. A portion of medical powder is collected in the medical powder collecting portion 34.

[0060]

The blister pack 31 of the second embodiment is constructed as previously discussed. Hereinbelow described in detail in reference to Figs. 15 and 16 are the flow of air passing through the medical powder storage chamber 36 and the flow of medical powder within the storage chamber during inhalation.

[0061]

First, inflow holes H1 and outflow holes H2 are pricked in the blister pack 31 and in the lid panel. Under these conditions, when the patient draws his or her breath while taking the inhalant port 7 in his or her mouth, at the initial stage of the inhaling action, as shown in Fig. 15, air introduced through the inflow holes H1, functions to fling up and diffuse a part of medical powder located at the top of the medical powder collecting portion 34. The upflung and diffused portion of medical powder is supplied into the outflow holes H2. When several times of inhaling actions are repeated, the medical powder stored in the storage chamber 36 can be gradually reduced. At this time, as clearly shown in Fig. 16, airflow passing

through the inflow holes H1 enters the medical powder collecting portion 34, and therefore medical powder collected in the collecting portion 34 is gradually flung up and diffused from the uppermost portion, and thus the diffused medical powder is supplied into the outflow holes H2 little by little.

[0062]

As discussed above, according to the second embodiment, it is possible to fling up and uniformly diffuse the medical powder stored in the storage chamber 36 little by little, thus preventing a large amount of air/medical powder mixture in one breath from being flown into the outflow holes H2, thus avoiding the outflow holes from being choked up with such a large amount of medical powder flow mass. Additionally, in the case that inhalant medication is made to a patient having a weak trachea, the patient can inhale the medical powder little by little. This prevents the patient from getting a fit of coughing during the inhalant medication, thus ensuring a stable medication during the breathing action.

[0063]

Next, Figs. 17 through 20 show the blister pack of the third embodiment. As detailed hereunder, the blister pack of the third embodiment is characterized by the blistered portion formed with a sloped surface that a side of the inflow holes penetrating the blistered portion is formed as a shallow portion, whereas a side of the outflow holes penetrating the blistered portion is formed as a deep portion. In explaining the third embodiment, for the purpose of simplification of the disclosure, the

same reference signs used to designate elements in the first embodiment will be applied to the corresponding elements used in the third embodiment, while detailed description of the same reference signs will be omitted.

[0064]

Reference sign 41 denotes a blister pack of the third embodiment used instead of the blister pack 21 of the first embodiment. Blister pack 41 is comprised of a base panel 42, a sloped surface 44, a lid panel 45, and a medical powder storage chamber 46.

[0065]

Reference sign 42 denotes the base panel of blister pack 41 of the third embodiment. In the same manner as the base panel 22 of the blister pack of the first embodiment, base panel 42 has a thin-walled disc shape and made of aluminum material, synthetic resin or the like. Additionally, base panel 42 has a plurality of blistered portions 43, 43, ... formed around its entire circumference. However, the base panel 42 of the third embodiment is different from the base panel 22 of the first embodiment, in that the shape of each blistered portion 43 differs from that of each blistered portion 23 of the first embodiment.

[0066]

As best seen in Fig. 18, each of the blistered portions 43 is formed as a radially-elongated, substantially elliptical convex portion extending in the radial direction of the base panel 42. The radially-elongated inward half of the blistered portion, in which inflow hole H1 is pricked, is formed as a comparatively shallow,

sloped surface 44, while the radially-elongated outward half of the blistered portion, in which outfloe hole H2 is pricked, is formed as a comparatively deep recess.

[0067]

Reference sign 44 denotes the sloped surface formed in the blistered portion 43. The sloped surface 44 is dimensioned or sloped downwards so that the convexity ratio of the blistered portion 43 increases from the inside corresponding to the inflow hole H1 side to the outside corresponding to the outflow hole H2 side.

[0068]

On the other hand, reference sign 45 denotes the lid panel affixed to the obverse of base panel 42. In the same manner as the previously-described lid panel 24 of the first embodiment the lid panel 45 has a thin-walled disc shape and made of aluminum material, synthetic resin, or the like.

[0069]

Reference sign 46 denotes the medical powder storage chamber defined between the blistered portion 43 and the lid panel 45. Medical powder is stored in the medical powder storage chamber 46. A predetermined amount of medical powder is stored in the medical powder storage chamber, such that almost all of the medical powder is mainly stored in the deep recess corresponding to the outflow holes H2 by way of the sloped surface 44.

[0070]

The blister pack 41 of the third embodiment is constructed as previously discussed. Hereinbelow described in detail in reference to Figs. 19 and 20 are

the flow of air passing through the medical powder storage chamber 46 and the flow of medical powder within the storage chamber during inhalation.

[0071]

First, inflow holes H1 and outflow holes H2 are pricked in the blister pack 41 and in the lid panel. Under these conditions, when the patient draws his or her breath while taking the inhalant port 7 in his or her mouth, at the initial stage of the inhaling action, as shown in Fig. 19, air introduced through the inflow holes H1, flows through the interior of the medical powder storage chamber 46 in a manner so as to push out the medical powder toward within the outflow holes H2, while diffusing the medical powder mainly stored in the deep recess of the blistered portion. Therefore, as shown in Fig. 20, the air introduced through the inflow holes H1 forcibly pushes the medical powder towards the outflow holes H2, and thus the medical powder stored in the storage chamber 46 is flown out of the outflow holes at a breath.

[0072]

According to the structure of the blister pack of the third embodiment, it is possible to flow out the medical powder stored in the storage chamber at a breath, such that the medical power accumulated around the outflow holes H2 is pushed out by way of air flow directed from the inflow holes H1 to the outflow holes H2. As a result, the patient can inhale the medical powder stored in the storage chamber 46 for a short time period. This reduces a burden on the patient's lungs. In particular, the

blister pack of the third embodiment is suitable to prescribe a relatively small amount of medical powder.

[0073]

Next, Figs. 21 through 24 show the blister pack of the fourth embodiment. As detailed hereunder, the blister pack of the fourth embodiment is characterized by the blistered portion formed with a sloped surface that a side of the inflow holes penetrating the blistered portion is formed as a deep portion, whereas a side of the outflow holes penetrating the blistered portion is formed as a shallow portion. In explaining the fourth embodiment, for the purpose of simplification of the disclosure, the same reference signs used to designate elements in the first embodiment will be applied to the corresponding elements used in the fourth embodiment, while detailed description of the same reference signs will be omitted.

[0074]

Reference sign 51 denotes a blister pack of the fourth embodiment used instead of the blister pack 21 of the first embodiment. Blister pack 51 is comprised of a base panel 52, a sloped surface 54, a lid panel 55, and a medical powder storage chamber 56.

[0075]

Reference sign 52 denotes the base panel of blister pack 51 of the fourth embodiment. In the same manner as the base panel 22 of the blister pack of the first embodiment, base panel 52 has a thin-walled disc shape and made of aluminum material, synthetic resin or the like. Additionally, base panel 52 has a plurality of blistered

portions 53, 53, ... formed around its entire circumference. However, the base panel 52 of the fourth embodiment is different from the base panel 22 of the first embodiment, in that the shape of each blistered portion 53 differs from that of each blistered portion 23 of the first embodiment.

[0076]

As best seen in Fig. 22, each of the blistered portions 53 is formed as a radially-elongated, substantially elliptical convex portion extending in the radial direction of the base panel 52. The radially-elongated inward half of the blistered portion, in which inflow hole H1 is pricked, is formed as a comparatively deep, sloped surface 54, while the radially-elongated outward half of the blistered portion, in which outfloe hole H2 is pricked, is formed as a comparatively shallow recess.

[0077]

Reference sign 54 denotes the sloped surface formed in the blistered portion 43. The sloped surface 54 is dimensioned or sloped upwards so that the convexity ratio of the blistered portion 43 reduces from the inside corresponding to the inflow hole H1 side to the outside corresponding to the outflow hole H2 side.

[0078]

On the other hand, reference sign 55 denotes the lid panel affixed to the obverse of base panel 52. In the same manner as the previously-described lid panel 24 of the first embodiment the lid panel 55 has a thin-walled disc shape and made of aluminum material, synthetic resin, or the like.

[0079]

Reference sign 56 denotes the medical powder storage chamber defined between the blistered portion 53 and the lid panel 55. Medical powder is stored in the medical powder storage chamber 56. A predetermined amount of medical powder is stored in the medical powder storage chamber, such that almost all of the medical powder is mainly stored in the deep recess corresponding to the inflow holes H1 by way of the sloped surface 54.

[0080]

The blister pack 51 of the fourth embodiment is constructed as previously discussed. First, inflow holes H1 and outflow holes H2 are pricked in the blister pack 51 and in the lid panel. Under these conditions, when the patient draws his or her breath while taking the inhalant port 7 in his or her mouth, at the initial stage of the inhaling action, as shown in Fig. 23, air introduced through the inflow holes H1, is brought into direct collision contact with the medical powder collected in the inflow hole H1 side, so as to diffuse the medical powder at a breath. Therefore, as shown in Fig. 24, the air introduced through the inflow holes H1 acts to gradually push the medical powder diffused in the medical powder storage chamber towards the outflow holes H2, and thus the medical powder stored in the storage chamber is gradually flown out of the outflow holes.

[0081]

According to the structure of the blister pack of the fourth embodiment, it is possible to diffuse medical powder by way of direct collision of the airflow introduced

through the inflow holes H1 with the medical powder. And thus, the blister pack functions to uniformly disperse the medical powder into the entire air flow, while adequately diffusing the medical powder within the medical powder storage chamber 56.

[0082]

Next, Fig. 25 shows the blister pack of the fifth embodiment. As detailed hereunder, the blister pack of the fifth embodiment is characterized by a flow-constriction orifice passage located between the inflow and outflow holes pricked in the blistered portion and a flap valve disposed in the flow-constriction orifice passage so that the flap valve fully opens only in presence of a strong inhaling action. In explaining the fifth embodiment, for the purpose of simplification of the disclosure, the same reference signs used to designate elements in the first embodiment will be applied to the corresponding elements used in the fifth embodiment, while detailed description of the same reference signs will be omitted.

[0083]

Reference sign 61 denotes a blister pack of the fifth embodiment used instead of the blister pack 21 of the first embodiment. Blister pack 61 is comprised of a base panel 62, a lid panel 65, a flow-constriction orifice passage 66, and a flap valve 67.

[0084]

Reference sign 62 denotes the base panel of blister pack 61 of the fifth embodiment. In the same manner as the base panel 22 of the blister pack of the first embodiment,

base panel 62 has a thin-walled disc shape and made of aluminum material, synthetic resin or the like. Additionally, base panel 62 has a plurality of blistered portions 63, 63, ... formed around its entire circumference. Each of the blistered portions 63 includes a radially-inward convex portion 63A and a radially-outward convex portion 63B, and a flow-constriction portion 63C provided between the two convex portions 63A and 63B.

[0085]

On the other hand, reference sign 64 denotes the lid panel affixed to the obverse of base panel 62. In the same manner as the previously-described lid panel 24 of the first embodiment the lid panel 65 has a thin-walled disc shape and made of aluminum material, synthetic resin, or the like. However, the lid panel of the fifth embodiment is different from the lid panel 24 of the first embodiment, in that lid panel 64 is formed at its inner wall with the flap valve 67 which opens and closes the flow-constriction orifice passage 66.

[0086]

Reference sign 65 denote the medical powder storage chamber defined between the blistered portion 63 and the lid panel 64. Medical powder is pre-stored in only the upstream side (that is, an inward convex portion 63A) of the two convex portions of the medical powder storage chamber 65.

[0087]

Reference sign 66 denotes the flow-constriction passage 66 arranged between the inflow holes H1 and outflow holes H2 pricked in the same manner as the first embodiment

and defined between the flow-constriction portion 63C of the blistered portion 63 and the lid panel 64. Reference sign 67 denotes the flap valve serving as the valve body attached to the lid panel 64 to open and close the flow-constriction passage 66. When an inhalation force of the patient is weak during inhaling operation, the flap valve 67 is kept at its closed position indicated by the solid line in Fig. 25, in a manner so as to fully close the flow-constriction passage 66. Conversely, when the patient's inhalation force becomes strong enough to diffuse the medical powder and to disperse the medical powder into the downstream convex portion, the flap valve is opened to permit fluid-communication between the two convex portions, with the flow-constriction passage 66 opened.

[0088]

According to the structure of the blister pack of the fifth embodiment, by means of the flap valve 67 it is possible to limit medical powder from being prescribed toward within lungs of the patient in case of a weak inhalation force. In other words, the blister pack is designed to permit medical powder to be prescribed toward within the lungs of the patient, only when the strength of airflow exceeds a strong airflow level enough to diffuse the medical powder. Furthermore, it is possible to intermittently or pulsatively prescribe medical powder toward within lungs of a patient by adjusting the magnitude of the inhalation force. And thus, the blister pack of the fifth embodiment insures adequate diffusion of the

medical powder, thus enhancing an efficiency of medication.

[0089]

In the first embodiment shown and described herein, although the inhalant medicator is exemplified in the blister pack 21 having eight blistered portions 23 (or eight medical powder storage chambers 25) circumferentially spaced from each other, the invention is not limited to the particular embodiments shown and described herein. In lieu thereof, a blister pack having two or more and seven or less blistered portions, or a blister pack having nine or more blistered portions may be used in the inhalant medication. In this case, the number of the recessed fit portions 8A of the holder 8, the number of the pin insertion hole pairs 8B, 8C, and the number of recessed fit portions 8D must be set to be identical to the number of the blistered portions. As appreciated, such a modified construction may be applied to the second to fifth embodiments.

[0090]

In the first embodiment, although each of the blistered portions 23 is exemplified in a blistered portion formed as a radially-elongated, elliptical convex portion extending in the radial direction of the base panel 22, the invention is not limited to the particular embodiments shown and described herein. In lieu thereof, as can be appreciated from a modification shown in Fig. 26, a blistered portion may be formed as a gourd-shaped convex portion 23'. In such a case, the narrow portion of the gourd-shaped convex portion forms a greatly reduced

flow-constriction passage between the two convex portions, thereby more effectively increasing the flow velocity of air flow through the orifice passage.

[0091]

[Effects of the Invention]

As set forth above, according to the invention as recited in claim 1, a flow-constriction orifice passage is provided between inflow and outflow holes pricked by piercing in the blistered portion. When airflow flowing from the inflow hole into the medical powder storage chamber is further directed to the outflow hole, the airflow passes through the flow-constriction orifice passage, and whereby the flow velocity becomes fast. By properly adjusting the passage area of the flow-constriction orifice passage depending on the property of medical powder, it is possible to create the optimal airflow suitable for the medical-powder property. As a result, it is possible to efficiently reliably prescribe a specified amount of medical powder pre-stored in the medical powder storage chamber into lungs of a patient by way of breathing action. This enhances medical benefits of the medical powder, thereby enhancing the reliability of the inhalant medicator.

[0092]

According to the invention as recited in claim 2, a flap valve is further disposed in the flow-constriction orifice passage and opens during inhaling operation. And thus, in the case of a poor inhalation force during inhaling operation, the flap valve closes the flow-constriction orifice passage. When the inhalation force has been

increased up to a level enough to diffuse medical powder, the flap valve opens the flow-constriction orifice passage to permit airflow through the opened valve. Thus, it is possible to restrict or limit inhaling operation in a state where the inhalation force is weak, and to permit inhaling operation only in a state where the inhalation force is strong enough to adequately diffuse medical powder by airflow. Furthermore, it is possible to intermittently or pulsatively prescribe medical powder toward within lungs of a patient by adjusting the magnitude of the inhalation force. And thus, the blister pack insures adequate diffusion of the medical powder, thus enhancing an efficiency of medication.

[0093]

According to the invention as recited in claim 3, a medical powder collecting portion is recessed between inflow and outflow holes pricked by piercing in the blistered portion to pre-store medical powder therein. When airflow flowing from the inflow hole into the medical powder storage chamber is further directed to the outflow hole, the airflow acts to gradually fling up and diffuse medical powder located in the medical powder collecting portion from the uppermost portion. Thus, it is possible to uniformly diffuse a small amount of medical powder in air.

[0094]

As a result, it is possible to avoid the outflow holes from being choked up with such a large amount of medical powder flow mass flown out at a breath. Additionally, in the case that inhalant medication is

made to a patient having a weak trachea, the patient can inhale the medical powder little by little. This prevents the patient from getting a fit of coughing during the inhalant medication, thus ensuring a stable medication during the breathing action.

[0095]

According to the invention as recited in claim 4, in the blistered portion, a sloped surface is formed to define a shallow portion at a side of an inflow hole pricked by piercing in the blistered portion and to define a deep portion at a side of an outflow hole pricked by piercing in the blistered portion. the medical powder, stored in the medical powder storage chamber, is accumulated around the outflow hole by way of the sloped surface. Thus, airflow flowing from the inflow hole toward the outflow hole forcibly pushes out the medical powder accumulated around the outflow hole, and as a result it is possible to flow the medical powder stored in the storage chamber out of the outflow hole at a breath. As a result, the patient can inhale the medical powder stored in the storage chamber for a short time period.

[0096]

According to the invention as recited in claim 5, in the blistered portion, a sloped surface is formed to define a deep portion at a side of an inflow hole pricked by piercing in the blistered portion and to define a shallow portion at a side of an outflow hole pricked by piercing in the blistered portion. The medical powder, stored in the medical powder storage chamber, is accumulated around the outflow hole by way of the sloped surface. Thus,

airflow flowing out of the inflow hole collides directly with the medical powder, and thus it is possible to adequately diffuse the medical powder, thereby ensuring uniform dispersion of medical powder in air. This enables the medical powder from being stably supplied little by little.

[Brief Description of the Drawings]

[Figure 1]

FIG. 1 is a longitudinal cross-sectional view illustrating an inhalant medicator to which the blister pack of the first embodiment of the invention is applied.

[Figure 2]

FIG. 2 is a plan view illustrating the inhalant medicator.

[Figure 3]

FIG. 3 is a longitudinal cross-sectional view illustrating details of only a medicator body of the inhalant medicator shown in Fig. 1.

[Figure 4]

FIG. 4 is a longitudinal cross-sectional view of the medicator body, taken along the line IV - IV shown in Fig. 3.

[Figure 5]

FIG. 5 is a lateral cross-sectional view illustrating the medicator body and a positioning mechanism, taken along the line V - V of Fig. 1.

[Figure 6]

FIG. 6 is a plan view illustrating only a blister pack holder.

[Figure 7]

FIG. 7 is a bottom view illustrating only the blister pack holder.

[Figure 8]

FIG. 8 is a perspective view of only a blister pack of the first embodiment as viewed from its bottom side.

[Figure 9]

FIG. 9 is a bottom view illustrating only the blistered portion.

[Figure 10]

FIG. 10 is an enlarged longitudinal cross-sectional view showing the essential part of the blistered portion, the medical powder storage chamber, and the flow-constriction orifice passage.

[Figure 11]

FIG. 11 is a longitudinal cross-sectional view illustrating the inhalant medicator in a state where medical powder stored in the storage chamber of the blister pack is inhaled.

[Figure 12]

FIG. 12 is an enlarged longitudinal cross-sectional view illustrating the airflow and medical powder flow within the medical powder storage chamber of the blister pack.

[Figure 13]

FIG. 13 is perspective view of only a blister pack of the second embodiment as viewed from its bottom side.

[Figure 14]

FIG. 14 is an enlarged longitudinal cross-sectional view showing the essential part of the blistered portion,

the medical powder storage chamber, and the flow-constriction orifice passage shown in Fig. 13.

[Figure 15]

FIG. 15 is an enlarged longitudinal cross-sectional view illustrating the airflow and medical powder flow within the medical powder storage chamber of the blister pack during the initial stage of inhaling operation.

[Figure 16]

FIG. 16 is an enlarged longitudinal cross-sectional view illustrating the airflow and medical powder flow within the medical powder storage chamber of the blister pack during the middle stage of inhaling operation.

[Figure 17]

FIG. 17 is a perspective view of only a blister pack of the third embodiment as viewed from its bottom side.

[Figure 18]

FIG. 18 is an enlarged longitudinal cross-sectional view showing the essential part of the blistered portion, the medical powder storage chamber, and the sloped surface shown in Fig. 17.

[Figure 19]

FIG. 19 is an enlarged longitudinal cross-sectional view illustrating the airflow and medical powder flow within the medical powder storage chamber of the blister pack during the initial stage of inhaling operation.

[Figure 20]

FIG. 20 is an enlarged longitudinal cross-sectional view illustrating the airflow and medical powder flow within the medical powder storage chamber of the blister pack during the middle stage of inhaling operation.

[Figure 21]

FIG. 21 is a perspective view of only a blister pack of the fourth embodiment as viewed from its bottom side.

[Figure 22]

FIG. 22 is an enlarged longitudinal cross-sectional view showing the essential part of the blistered portion, the medical powder storage chamber, and the sloped surface shown in Fig. 21.

[Figure 23]

FIG. 23 is an enlarged longitudinal cross-sectional view illustrating the airflow and medical powder flow within the medical powder storage chamber of the blister pack during the initial stage of inhaling operation.

[Figure 24]

FIG. 24 is an enlarged longitudinal cross-sectional view illustrating the airflow and medical powder flow within the medical powder storage chamber of the blister pack during the middle stage of inhaling operation.

[Figure 25]

FIG. 25 is an enlarged longitudinal cross-sectional view showing the essential part of the blistered portion, the lid panel, the medical powder storage chamber, the flow-constriction passage, and the flap valve in the fifth embodiment of the invention.

[Figure 26]

FIG. 26 is a bottom view illustrating only the blistered portion of the modification made according to the invention.

[Description of Reference Signs]

21, 31, 41, 51, 61 Blister Pack

22, 32, 42, 52, 62 Base Panel
23, 33, 43, 53, 63, 23' Blistered Portion
24, 35, 45, 55, 64 Lid Panel
26, 66 Flow-constriction Passage
34 Medical Powder Collecting Portion
44, 54 Sloped Surface
67 Flap Valve (Valve Body)
H1 Inflow Hole
H2 Outflow Hole

[DOCUMENT NAME] ABSTRACT

[Abstract]

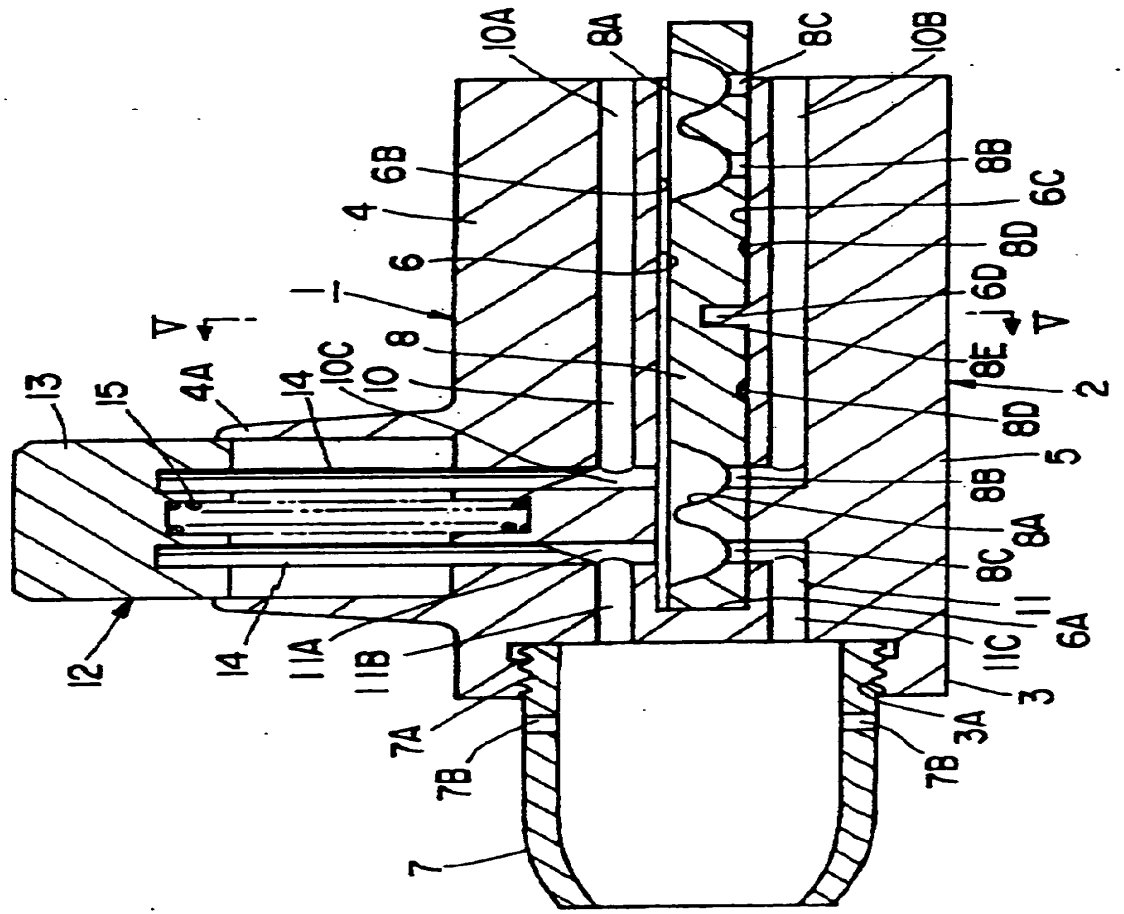
[Object] It is an object to enhancing a medication efficiency by properly diffusing medical powder stored in a medical powder storage chamber depending on a property of the medical powder.

[Means to solve] A medical powder storage chamber 25 of a blister pack 21 is configured to define a flow-constriction orifice passage 26 located between inflow and outflow holes H1 and H2 by a flow-constriction portion 23C of a blistered portion 23. Thus, the flow velocity of airflow from the inflow hole H1 to outflow hole H2 can be increased by way of the flow-constriction orifice passage 26. Additionally, by adjusting the flow passage area of the flow-constriction orifice passage 26, it is possible to create airflow suitable to the property of medical powder. Therefore, the medical powder stored in the medical powder storage chamber 25 can be properly diffused by way of the airflow suited to the medical-powder property, and whereby the medical powder can be efficiently blended with airflow. As a result, it is possible to efficiently prescribe a specified amount of medical powder pre-stored in the medical powder storage chamber 25 into lungs of a patient by way of breathing action.

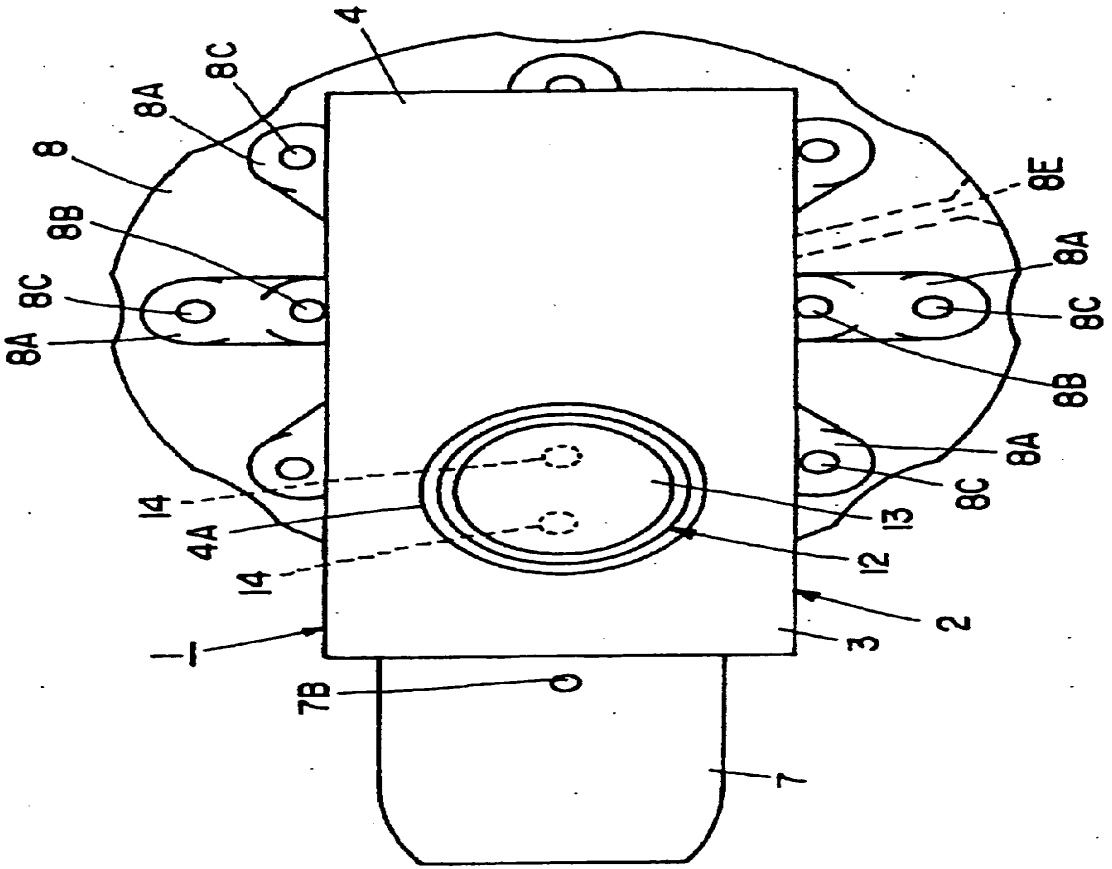
[Selected Drawing] Figure 12

[DOCUMENT NAME]　DRAWING

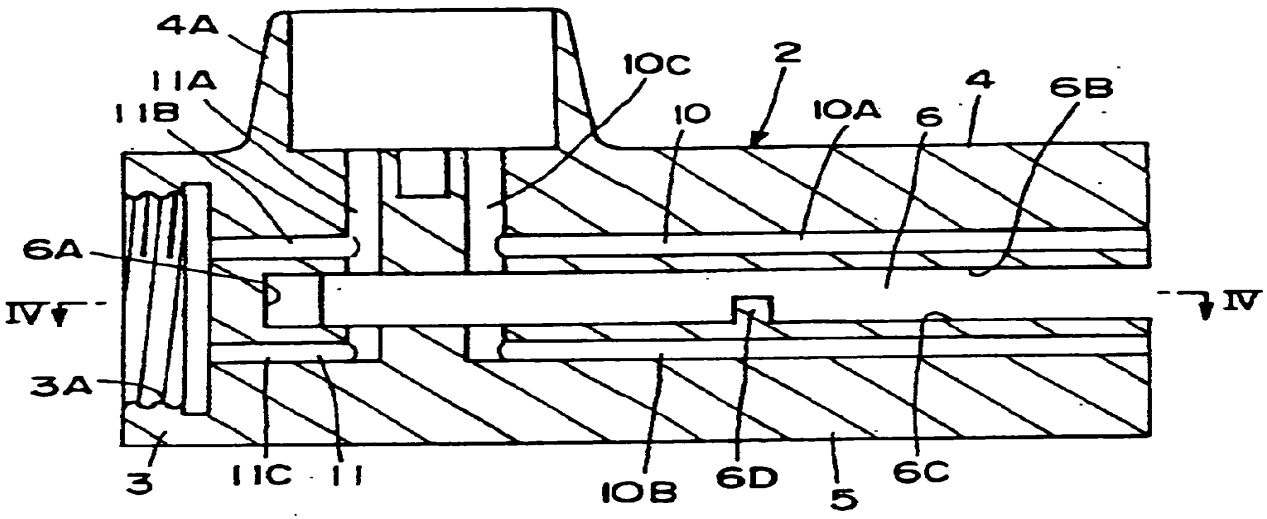
[FIGURE 1]



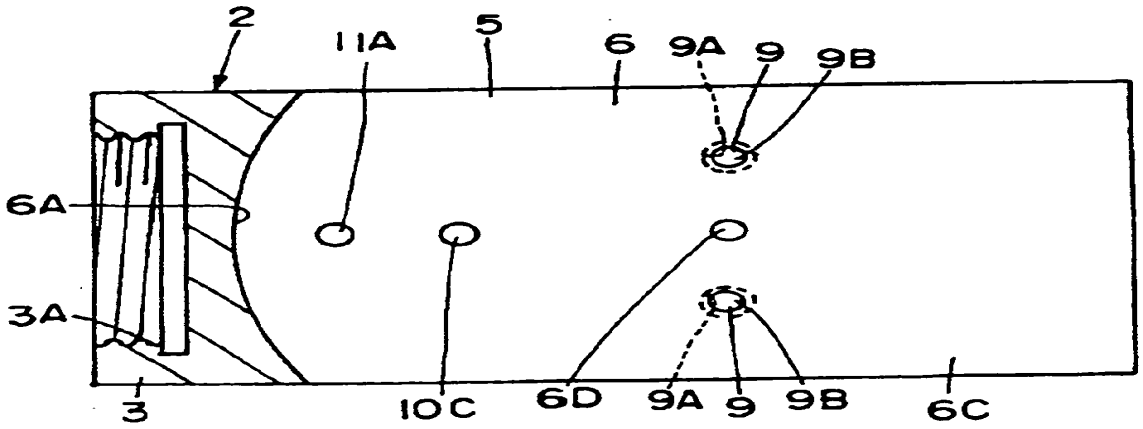
[FIGURE 2]



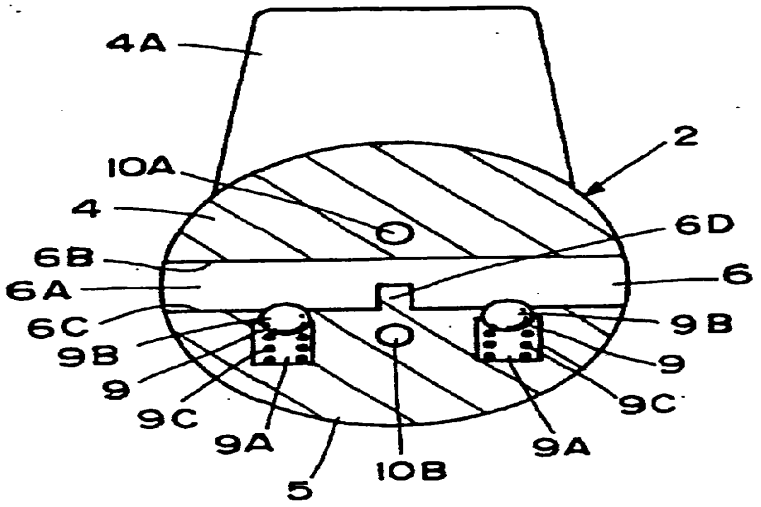
[FIGURE 3]



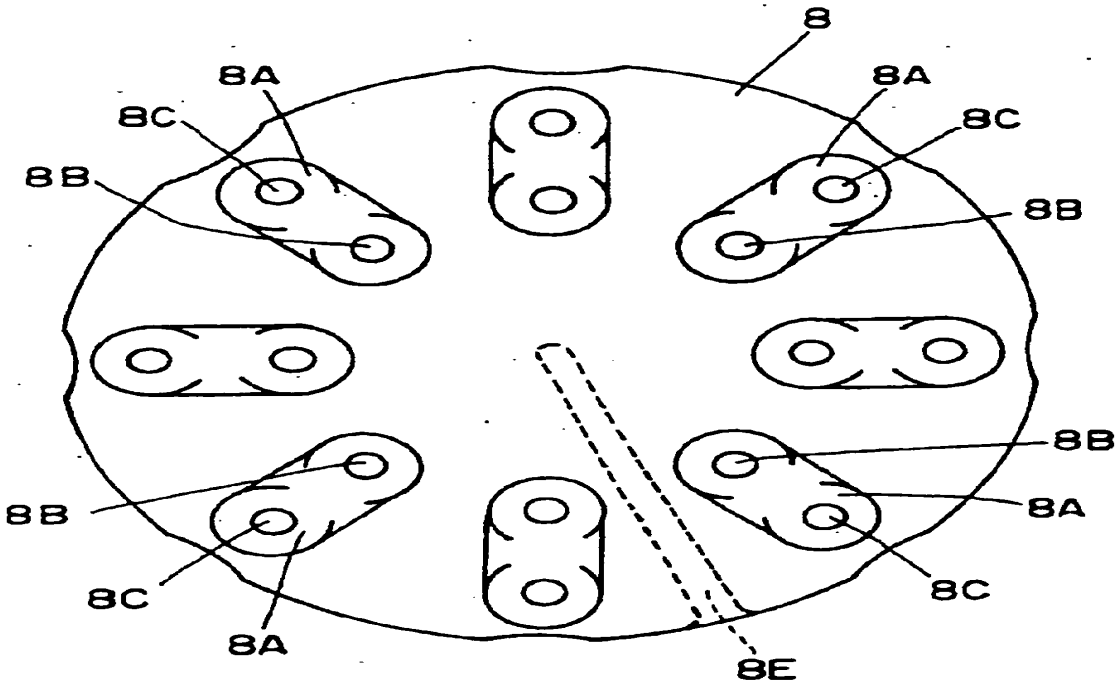
[FIGURE 4]



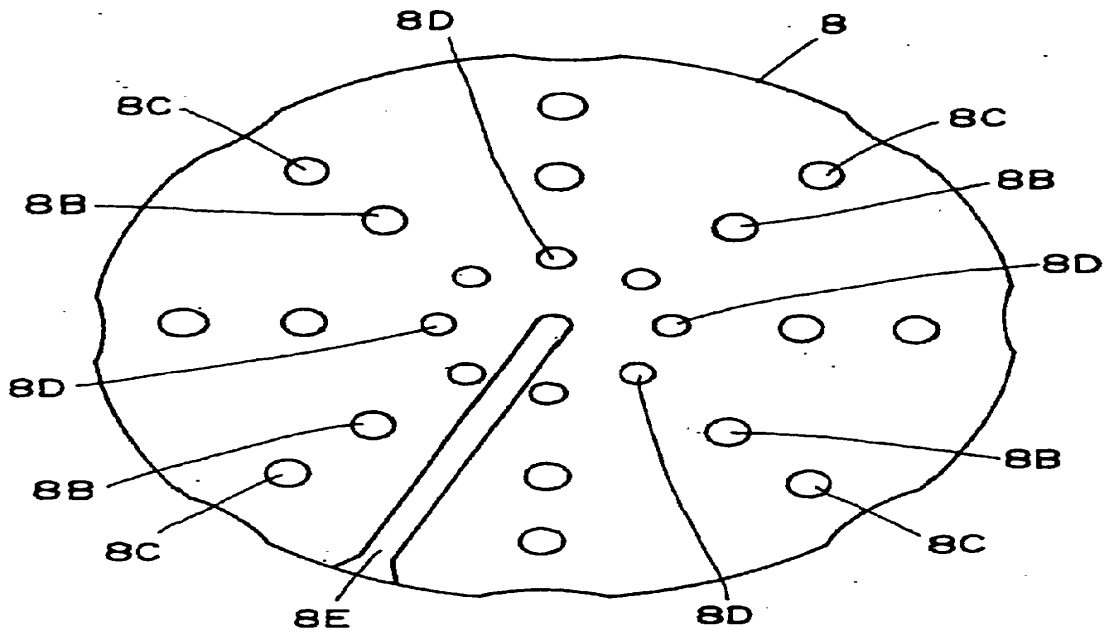
[FIGURE 5]



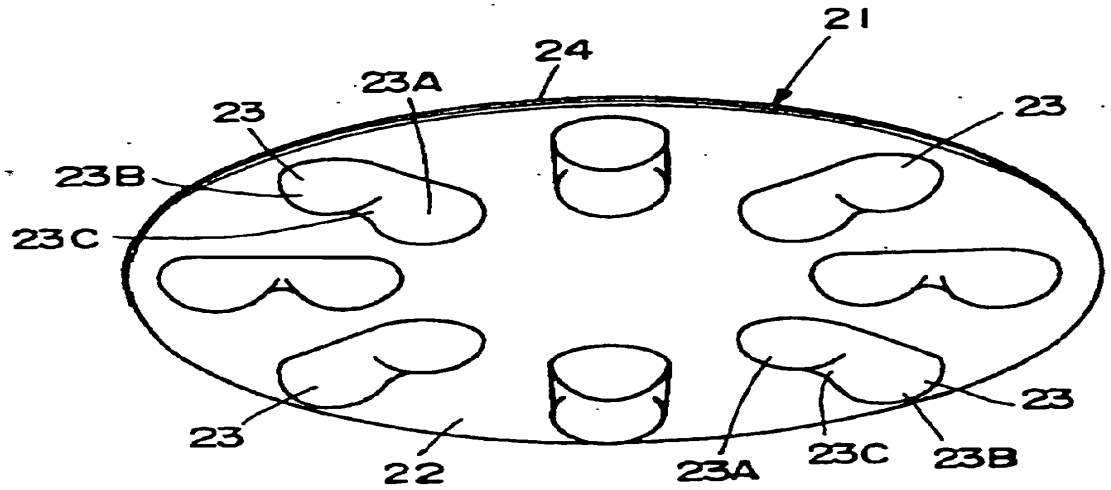
[FIGURE 6]



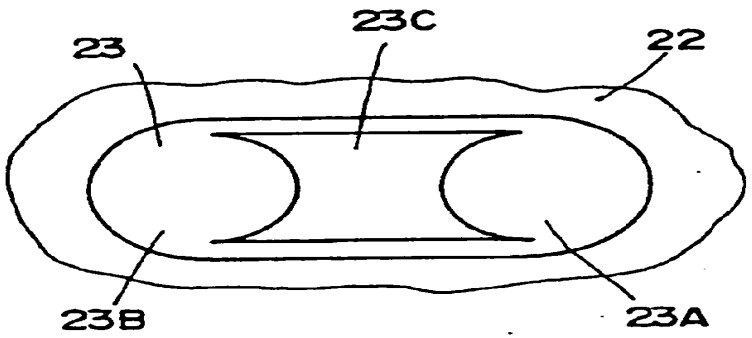
[FIGURE 7]



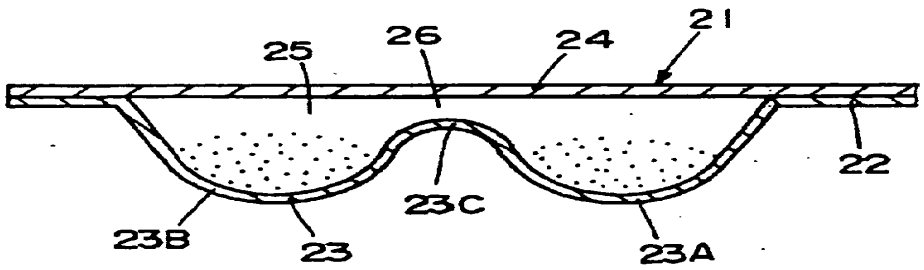
[FIGURE 8]



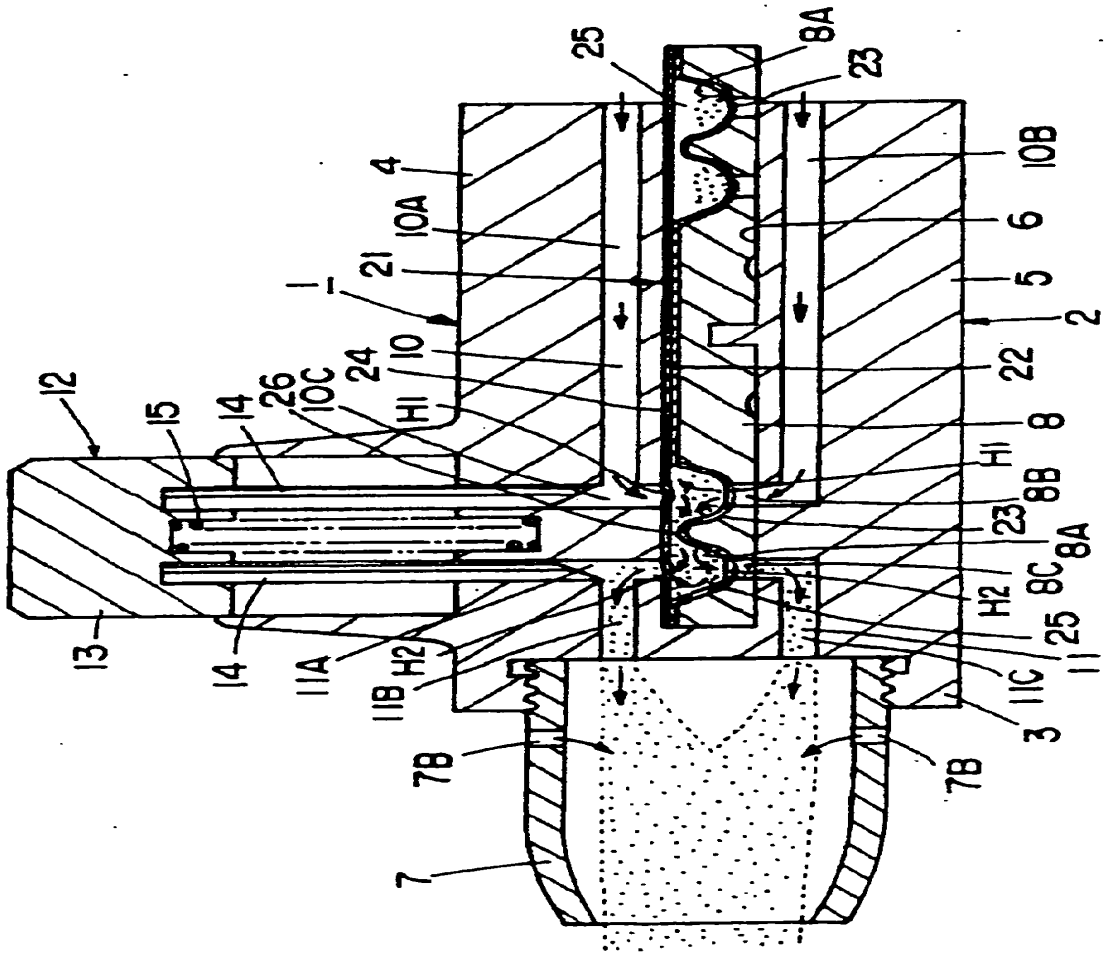
[FIGURE 9]



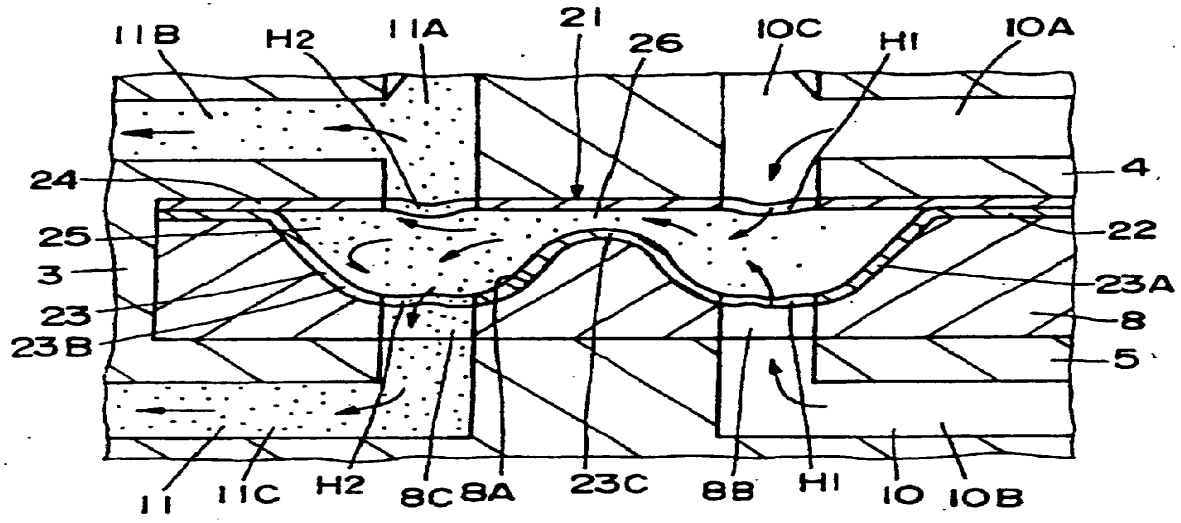
[FIGURE 10]



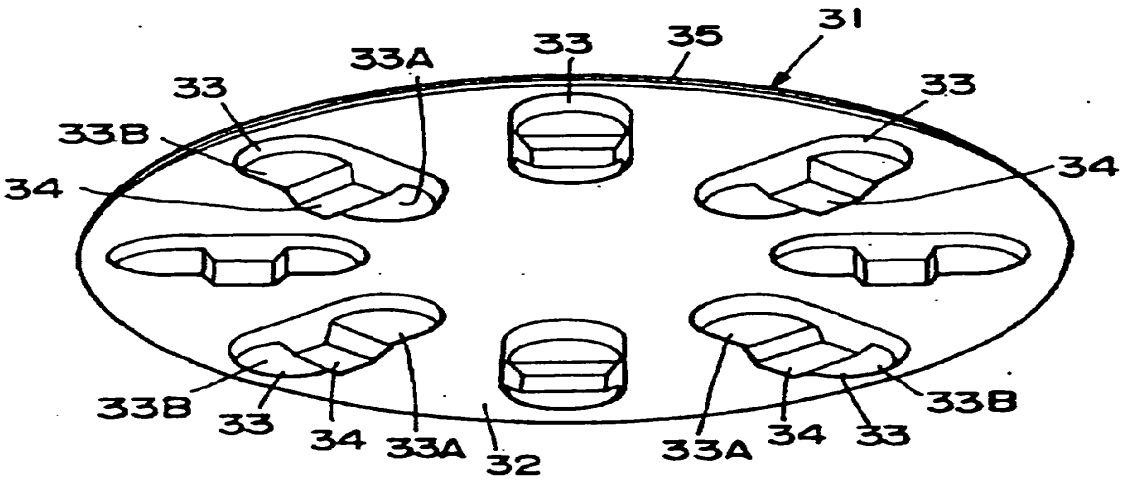
[FIGURE 11]


25
8A
23
10B
4
10A
6
21
5
1
2
10
22
24
10C
H1
8
12
15
14
26
H1
8B
23
8A
8C
H2
25
11
11C
3
13
14
11A
11B
H2
7B
7B
7

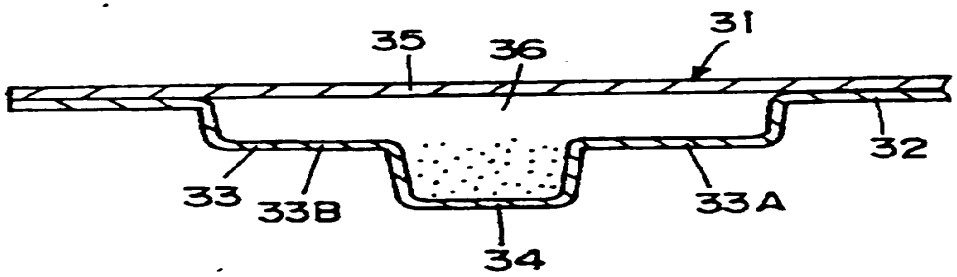
[FIGURE 12]


11B
H2
11A
21
26
10C
H1
10A
24
4
25
22
3
23A
23
8
23B
5
11
11C
H2
8C
8A
23C
8B
H1
10
10B

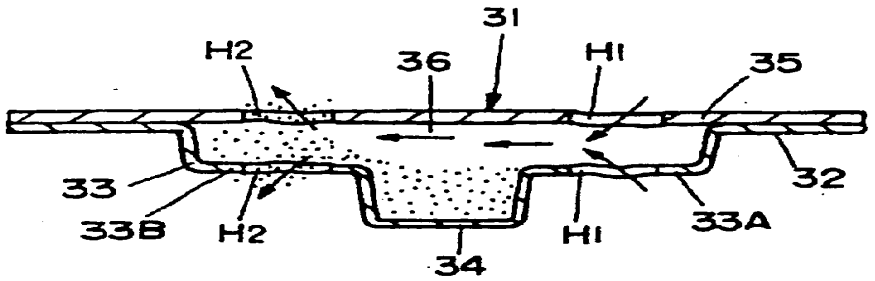
[FIGURE 13]



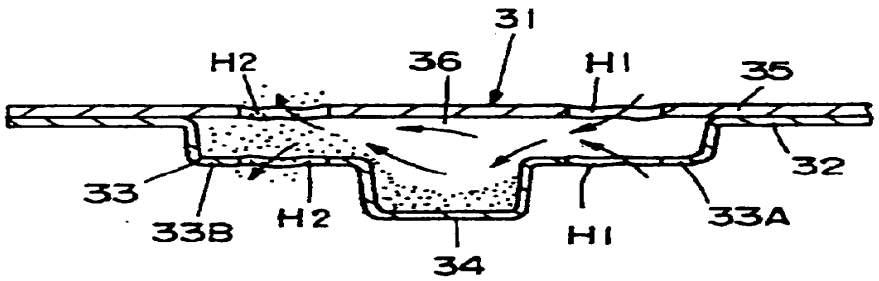
[FIGURE 14]



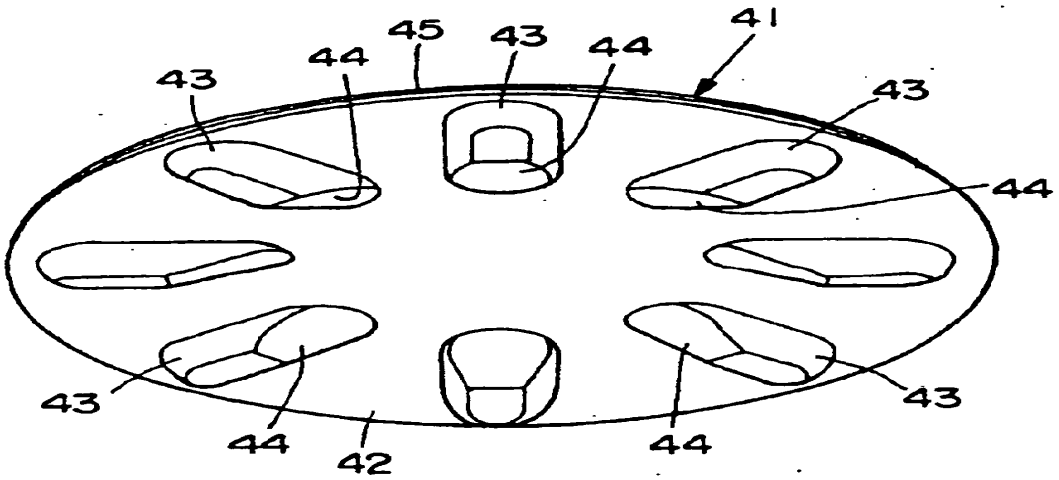
[FIGURE 15]



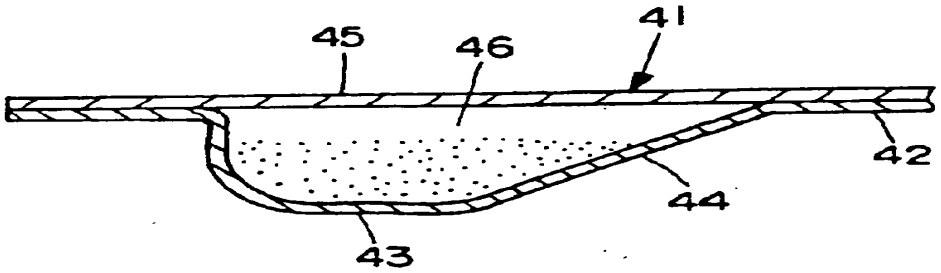
[FIGURE 16]



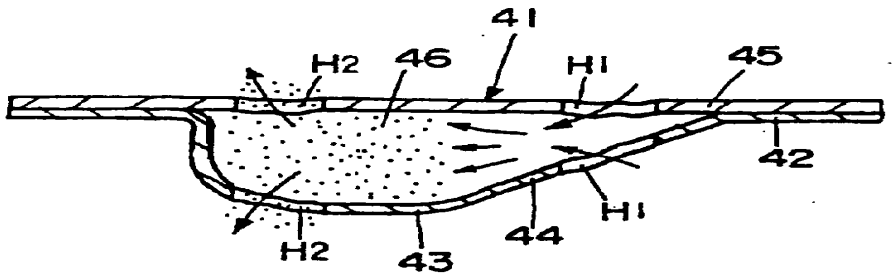
[FIGURE 17]



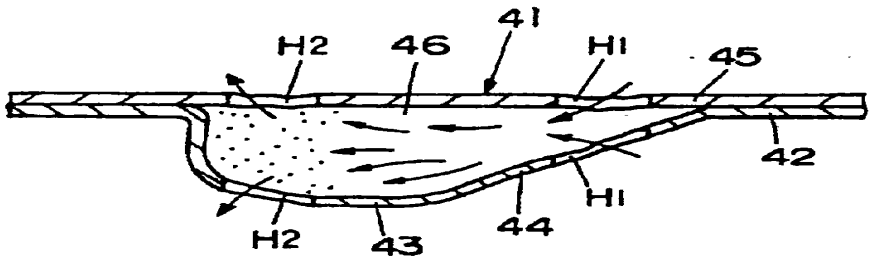
[FIGURE 18]



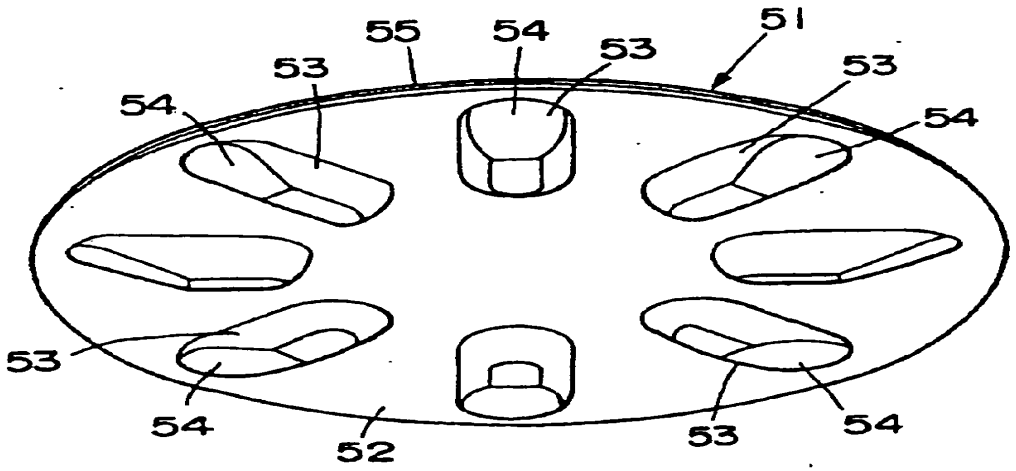
[FIGURE 19]



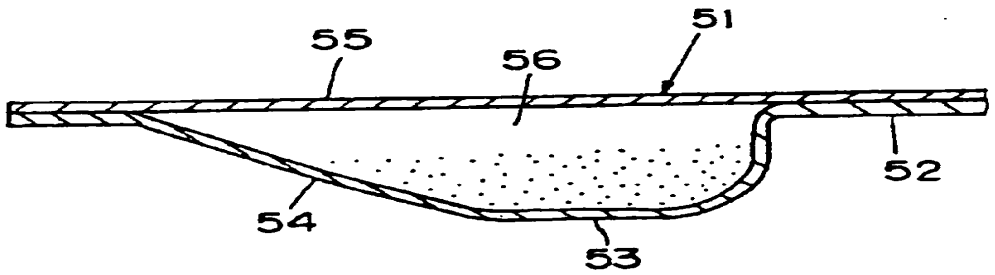
[FIGURE 20]



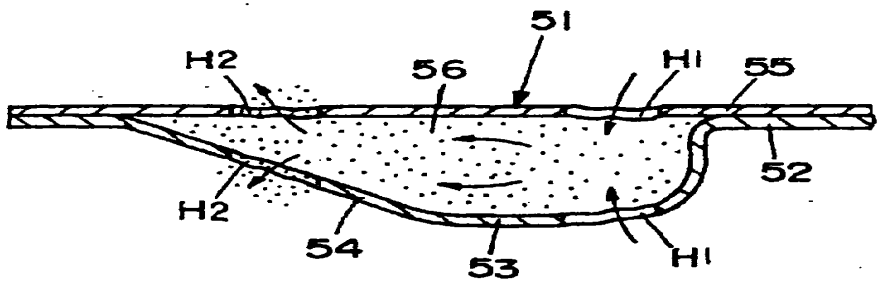
[FIGURE 21]



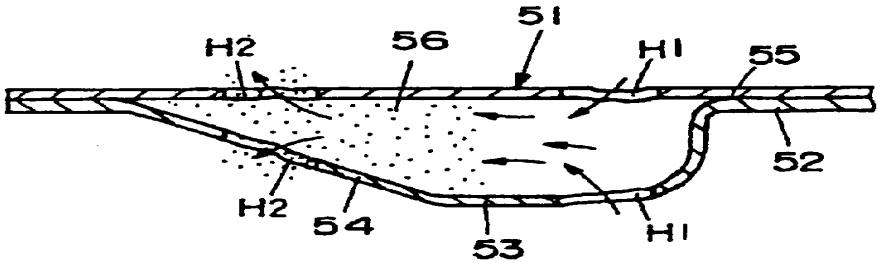
[FIGURE 22]



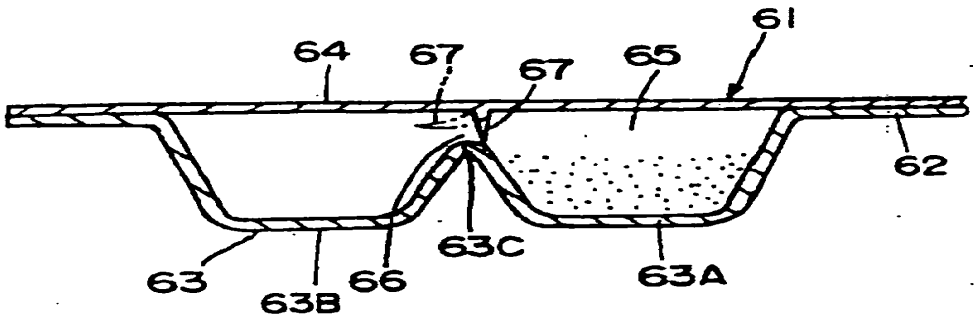
[FIGURE 23]



[FIGURE 24]



[FIGURE 25]



[FIGURE 26]